

## nonACE MEETING, August 3, 2004

Date: Mon, 02 Aug 2004 14:58:57 -0500

From: Eugene JJ Schmidt

To: cdf\_aces@fnal.gov

Subject: Ace Meeting Canceled (Tuesday, August 3) but Please Read This Email

The Ace Meeting for Tuesday, August 3 is canceled.

Here are a few notes to consider....

- \* Over the weekend, there was a concern that a B0 quadrupole magnet would have to be replaced. Luckily this was not the case and we are back in operation. It is clear however that if the Tevatron had a major component failure, the August 23 shutdown would start early.
- \* The Tevatron has reached its design goal of 300 pb<sup>-1</sup> integrated delivered luminosity for fiscal year 2004. You however should not slack off in your diligence! Remember the events you save may go into your analysis...
- \* There will probably be another set of back-to-back mixed-mode stores this week.
- \* There will also be some studies and/or accesses in the injector complex but if everything goes well, we will have more or less continuous collisions all week.
- \* NEW ACES START FRIDAY OWL SHIFT. Please think about what you will do to train them. The more you have the new ACES do hands-on training, the faster they will learn. However, we do not want to lose much efficiency and we certainly do not want to endanger the detector during training. Think about what you will do.

<http://www-cdfonline.fnal.gov/ace2help/aceknowledge.html>

contains a list of some of the items you should teach.

I also asked new ACES to read the RUN II Ace Detector Guide and Steve Hahn's opening lectures from June Ace Training.

- \* If a downtime entry has multiple causes, remember that you can split the entry into smaller pieces with different downtime categories by using the "edit entry" and "add entry" features on page E8. Just don't have entries that overlap in time.

\* Trigger table tests with FPS (fractional prescale) and UPS (uber prescale) will continue this week.

If you have questions or issues, send me an email.

thanks, JJ

Date: Tue, 03 Aug 2004 09:53:08 -0500  
From: Eugene JJ Schmidt  
To: cdf\_aces@fnal.gov  
Subject: New Michigan TDC Operation Guide

> Date: Mon, 02 Aug 2004 15:10:37 -0500  
> From: jameseb@fnal.gov  
> Subject: TDC Note  
>  
> Hi JJ - I wanted to point you to CDF note 7164 which  
> was released today. It contains some information on  
> TDC cards which the Aces might find useful. Perhaps,  
> a link could be added from the Ace web page.  
>  
> Thanks, Eric

Aces - this note can be found at

[http://www-cdf.fnal.gov/cdfnotes/cdf7164\\_tdc\\_maintenance.pdf](http://www-cdf.fnal.gov/cdfnotes/cdf7164_tdc_maintenance.pdf) .

It is also linked on the DAQ ACE help page under "Resources".

JJ

This is new improved version written by Round 9 Aces for Round 10 Aces (May, 2004).

The [previous version can be found here](#) and may still be a useful list.

ACEs - please help update this document!

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This is an attempt at a list of the things that every ACE should know. Most of it is phrased either as a) a checklist for things to do over the course of a shift, or b) a short tutorial, since I found that I learned things much faster by doing them than by trying to memorize things. I have tried to put the most important things at the start of each section.

Beta version -- (please) Send comments to corrinne mills -- cmills at you-know-where dot gov

## Things to keep in mind over the course of a shift!

Before you do anything

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- 0) Learn how to make an elog entry and search the elog.
- 1) Learn to understand Channel 13.

At the start of your shift

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- 0) Read the elog right before you come in if possible
- 1) Read the whiteboard for recent info!
- 2) Have a look at channel 13
- 3) Ask the previous shift's ACEs what is new
- 4) Using all of the above, find out:

a) Have there been any changes to the trigger table?

b) Are any detectors in a non-standard HV configuration?

c) What is the luminosity and how are the losses?

d) If there is beam, when is MCR planning to drop the store?

If there is no beam, when is shot setup scheduled?

During shot setup

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## 0) Follow the shot setup checklist

During data-taking

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DAQ Ace: At regular intervals, look up from The Onion and check the following:

- 0) Are any crates red in the Local Client Controller?
- 1) Is the L1 accept rate reasonable for this data type?  
(10s of kHz for beam data,  
50-80 Hz for cosmics)
- 2) Is the deadtime reasonable for this data type (5 to 6% early in a store, more like 3% later,  
negligibly small for cosmics.)
- 3) Is anything funny in the L3 farm display? (gold or green nodes or subfarms)
- 4) Scroll to the bottom of the errorlog in the Error Display. Anything unusual?
- 5) Anything bad in Big Brother? If so, check the history to see if it is transient.
- 6) Anything red in the VXWorks controller?

MON Ace: At regular intervals, stop stuffing your face and check the following:

- 0) Is anything yellow or red in the Global Alarms Page?
- 1) Any warnings in TeVMon?
- 1) Are the losses likely to cross into the unsafe regime soon (over 20 kHz for LOSTP, LOSTPB,  
PAGC or AAGC)? If they are averaging above 18 kHz, you will get a TeVMon warning.  
If that happens, ask the SciCo to call MCR and tune. If the losses average above 20 kHz  
or you get any other TeVMon warning, if the silicon is on, **bring it to standby (not off) immediately.**
- 2) Are there any pink cells (squares) in IMON?

At the end of the store

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- 0) Ask the SciCo to ask the MCR how much quiet time there will be
- 1) DAQ ACE should halt the run 10 min before the predicted end of the store

- 2) MON ACE should bring the HV back to the end of store (hit "end of store button" to take care of everything but the silicon, and bring the Silicon to STANDBY if it was ON.)
- 3) As soon as you have quiet time, run calibrations! ( All standard calibrations should be done after every store, if possible)

## DAQ ACE Tutorial

0) Do this during non-data taking time. End of store TeV studies would be a good time.

Quiet time is not necessary.

- 1) Open Run Control from scratch (setup fer; rc &).
- 2) Select a partition from the Partition menu.
- 3) Select the run configuration L2\_TORTURE
- 4) Check that the trigger table numbers listed at the bottom of the screen match the current physics table on the whiteboard.

5) Partition, Config, and Activate.

The level 3 display and errorlog windows are often useful for diagnosing problems.

- 6) Check the total L3 accept rate and the total deadtime.
- 7) What is the accept rate for trigger blah?
- 9) What is the most recent error in the errorlog display?
- 10) Open the errorlog for this run number in an xterm (it's in ~cdfdaq/errorlog/errorlogRUNNUMBER.log).

This is useful for pasting error messages into the elog.

The most common way to recover from a DAQ problem is an HRR. Typically this will happen automatically.

- 11) Issue an HRR.
- 12) In the Error Display, disable, then re-enable Automatic HRRs.

(or enable them if they are not yet enabled.)

If there is a trigger inhibit from a trip in a detector (other than Silicon), it is best to always pause the run until the inhibit has cleared, since some detector systems (CES, CPR, CCR, I'm looking at you)

release the inhibit before being at an adequate voltage for data-taking.

14) Pause the run, and then restart it.

Sometimes you will have a problem that will not be solved by HRR. The troubled

crate or system will turn red in the Replies and Acknowledgements window.

Perhaps the most common recovery procedure is to shepherd the belligerent crate.

Pretend for the moment that b0muca00 has hung or produced an error message requesting shepherding.

NB about shepherding: No gratuitous shepherding, and check the list on the DAQ ACE page for crates you should never shepherd.

14) Halt the run.

13) Find the "Replies and Acknowledgements from our Clients" window.

15) Bring up the LocalClientController for b0muca00 by clicking on its name in the

Replies and Acknowledgements window.

16) Shepherd the crate by hitting the "Reboot, Reset, and Shepherd" button.

17) When that has finished ("IDLE SUCCESS" in the text window that pops up), Recover and Run.

17.5) Look at [this](#) [page](#) for other ways to reboot crates, as well as notes on which crates

should not be reset by ACEs.

More serious problems will require you to abort or reset the run.

18) Abort the run, then transition back to the active state.

19) Reset the run. You should be in the start state.

In the event of a very persistent problem, or to run tests, you may have to take subsystems out of the run configuration manually. You *\*must\** be in the start state to do this.

20) Bring up the Edit Run Configuration window (from the Parameters menu).

21) Remove L3 subfarm 7 from the configuration by unchecking the box next to it.

22) Remove b0ccal03 from the configuration by selecting it from the box in the lower left and

clicking the ">>" button.

24) Bring RC back to Active. Shift-click on the next transitions to have them auto-activate when the previous transitions are done.

25) Run for a few minutes.

In runs where we are taking actual data, some things are different (trigger inhibits, trigger tables)

26) End the run and reset Run Control. Select the run configuration "Cosmic/ACE\_COSMICS\_NOTRACKS".

27) In the start state, go to the "Edit Run Configuration" window. Click on the name of the trigger table. Here you can select other trigger tables from the one loaded by default (don't do so now, though).

27) It is also possible to select decoupled tables by selecting "Level 1,2 Special Trigger Types (decoupled from L3)". Select this from the Trigger menu, just to see what the options are, but then click "Cancel". Chances are good that you won't have to do this, but you should know about it.

27) While you are still in that window, in the "Inhibits" menu, deselect "Ignore Inhibits". Now any red trigger inhibits (in the Inhibit Interface) will stop datataking (NB Normally, you would ignore inhibits for this running mode, but for the same reason, it's a safe place to try out the inhibit system).

27) Partition, Configure, and Run. Notice that if you have any red boxes in the Inhibit Interface, you are not taking any data, and the "Inhibit Status" in run control is red.

27) Mask the trigger inhibits that are red by clicking on them. It takes a minute for them to take effect. Sometimes you have to click twice. , wait to see if it takes, then unmask it.

28) Check whether the CSL is backing up. Find the Consumer-Server/Logger Display and click on the button "message queue". If it is mostly in "Receiver" you are ok, but if there are large bars anywhere else it is

indicative of a problem.

29) Note the L1 accept rate and the L2 accept rate for cosmics. Now go to the L3 trigger rate monitor, and (\*\*\*\*\* prescale and check that it does what you expect.) not yet, need advice on a good way to do this

30) While you're at the L3 controls, bring up the ACE control panel and find the buttons for "Cleanup L3" and "Cleanup EVB". Don't do this right now, since it's a good idea to do this as little as possible, but this is the only way to recover from certain errors. (The error message from RC will tell you to do this).

Other random stuff:

Sometimes you will have to reset a VRB in one of the event builder crates.

31) Go find the reset button on slot 14 in crate b0eb15 (Not the CPU reset in the first few slots), on the first floor. PROCMON monitors DAQ processes.

32) Go to the ["Important CDF DAQ Processes"](#) page on the DAQ ACE page for instructions on resetting these.

Big Brother monitors the DAQ computers. You should only worry about problems here if they are persistent, which you can check by pulling up a history.

33) Pull up the history of the CPU usage on b0dap73 by clicking on the icon under cpu for that computer, and then clicking the "History" button. It will probably show that the computer has been in a bad state for at least a few minutes.

## Monitoring ACE tutorial

It is tougher to write a tutorial for the Monitoring ACE, since their primary job is to react to anomalous situations as they occur, and it is a bad idea to practice since mucking around with the HV is a very, very bad idea.

## IFIX

The MON ACE's main tool is IFIX, which monitors, and allows you to control, all of the HV in the detector. Clicking on the detector name or on the "D" (which one depends on the system) to bring up a picture of the detector.

0) Bring up the detector display for one detector (say, the CMP) by clicking on the "D" button. Notice that it is possible to select parts of the detector, and apply the "ON", "STANDBY", and "OFF" commands to those individually.

1) Click on the "D" for SVX. This brings up an alarm summary. This can help diagnose silicon trips.

## ACNET

ACNET is a real antique (It is run on VAXes, for crying out loud). Like any other antique, it has its quirks. This is a quick and dirty tutorial, for more info and other tutorials see [the main CDF acnet page](#).

It is a cross between a text terminal and a GUI. You interact with it by using the mouse to place the cursor where you want to type, typing in the text (without moving the mouse!), and **then** clicking. The text will change color when it is entered.

## Fast-Time Plots (E11, aka "E-Z Writer")

The fast-time plots allow you to keep track of the instantaneous status of the beam.

Usually you will not have to restart the fast-time plots. They are almost always running.

One ACNET terminal can run up to three fast-time plots, labeled SA, SB, and SC

2) Either find the terminal at page E11 (one is probably already open), or

go to page E11 by entering "E11" at the uppermost left hand corner of an ACNET terminal.

You can minimize ACNET terminals in the usual way, and bring them back up by

clicking on an unshaded TV icon and then clicking "Restore".

3) Find the text \*SA(diamond). Click on this to scroll through the three plots

which are currently loaded.

4) Verify that these three sets of plots are loaded, or load them by

a) Click on tev loss at the bottom, and select the line which says:

C:B0PLOS, C:B0ALOS, C:LOSTP, C:LOSTPB

a) Click on tev loss at the bottom, and select the line which says:

E:SVRAD0, E:SVRAD1, E:SVRAD2, E:SVRAD3

a) Click on loss at the bottom, and select the line which says:

C:B0PBSM, C:B0ABSM, C:B0PAGC, C:B0AAGC

5) Change the range on one of the plots by placing the cursor over the current maximum,  
entering the new one, and clicking.

Hourly Plots (D44, aka "Lumberjack Datalogger")

A lot of information is stored in the ACNET system, and you can use it to make plots of different quantities, over the time range you specify. The thing you will do most often with ACNET is to make hourly plots. These are pasted in the elog as a reference. Yes, you should really make them every hour, as long as we are taking data.

6) Find a different ACNET terminal and go to page D44.

7) To make an hourly plot, click on "Recall" at the bottom of the terminal and select

the plot set you want (start with "Shift Losses"). Then, set the start and end times at "T1" and "T2".

8) Click on any of the names of the plots (e.g. C:B0PLOS) to make it draw them all.

9) Have the outgoing ACEs show you the current best way to save the picture and  
paste it in the elog. (Right now, it's Alt-

PrintScreen to capture, open Jasc

Paint Shop, Control-V to paste, F12 to save as a GIF, and then "Paste Image" in the elog.)

10) Make hourly plots for all of the following:

a) Shift Losses: (C:B0PLOS, C:B0ALOS, C:LOSTP, C:LOSTPB)

b) SI-TEST1: (T:L1COLI, T:RFSUM, C:B0PBSM, C:B0RAT4)

c) SI-TEST2: (T:SBDMS, T:RFSUMA, C:B0ABSM, C:B0ILUM)

d) Abort Gap: (C:B0PAGC, C:B0AAGC, C:B0ABSM, C:B0PBSM)

Shot Setup plots and the End of Store plots (D44)

No need to practice these but you should know about them:

\* At the end of Shot setup, plot (at least) "Shift Losses" and SVRAD for the duration of the shot, including 5-10 min of running afterwards

\* At the end of the store, plot all 4 of the hourly plots, plus "Shift Luminosity", for the entire duration of the store

The Downtime Logger (E8)

For recordkeeping purposes, we record the sources of downtime which cause datataking to stop for 2

or more minutes while there is colliding beam in the machine.

11) Open ACNET page E8

12) Click on Auto-Entry

13) If there are any unfilled causes of downtime, they'll be listed. During normal running, there's usually at least one. If there isn't, try this another time (when there is).

14) To make an entry: Click on "Save" then on the entry you want to save, it'll bring up an auto-entry log.

15) If you don't know what caused the downtime, find it in the elog.

16) Click Name Help and select the category which best describes the source of downtime,

then fill in the details below. Click Save when you're done.

Silicon Considerations

Silicon has its own set of monitoring tools in the control room, IMON (full of colored squares, monitors currents in the detector) and the PS Gui (allows you to control silicon HV independent of IFIX).

17) In IMON, bring up the history for a cell by clicking on it, to see if there

has been any change recently. This is useful for diagnosing pinkies.

18) In the Silicon GUI, click on one wedge of one of the detectors. Notice that the

individual controls for the ladders in that wedge are now available in the upper

left hand corner. Don't use them, but remember that they're there.

19) Find the silicon cooling alarms and note that the lights are on. The light will

go off on the detector which has tripped. Read [here](#)

for how to respond to cooling alarms.

20) Open a silicon alarm page by clicking on the "D" for any of SVX, ISL, or L00. Find

the second line, which says PS-ALARM. If you get a trip and this field

says "Crate N Communication Error", you need to Hockerize the crate.

21) Read the Hockerization instructions and locate the CAEN reset panel on the first floor.

## Monitoring

As many, if not more, problems are caused by glitches in monitoring rather than in the actual detector

Often the ICICLE process, which coordinates between Run Control and IFIX, will crap out.

22) Find the computer on which ICICLE runs, and find the executable "Icicle.exe", which should

be on the desktop. Open that executable to restart ICICLE when needed.

Many times you will have to restart one of the monitoring PC's.

Of particular note is the TOF PC,

which thinks it's Paul Revere and sounds a (heartbeat) alarm just after midnight, with remarkable

regularity. The solution to this class of problems is to reboot

the PC in question.

23) Have an outgoing ACE show you where the TOF, PISABOX, muon3, and COT PCs are  
in the first floor computer room.

Other

At the beginning of stores, you have to check the clock crate for errors

24) Find the clock crate (same floor as the control room, rack 2RR21).

25) Remind yourself not only that PSM alarms will almost always reset themselves,  
but also that you need to put them in the elog anyways.

Calibrations and Quiet time

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0) Run through all of the calibrations once. There are pretty good instructions

[here.](#)

Calibrations advice:

- Do the quiet time calibrations first
- Check that it is really quiet time before starting. (No, really, I screwed this up once.)
- Let the CO know that you are running calibrations and remind them to check the results.

Miscellaneous

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0) DO NOT EVER turn the silicon OFF unless the silicon SPL is standing there telling you to do it.

1) DO NOT EVER turn the silicon from OFF to STANDBY unless the silicon SPL is

standing there telling you to do it.

2) IF YOU GET A TEVMON ERROR, BRING THE SILICON TO STANDBY (unless it is off).

3) DO NOT EVER book the silicon crates into your partition unless you know that you

will be taking physics data with silicon, or you are doing a silicon calibration  
or coldstart.

42) If there is a quench, don't panic. It's too late

anyways.

5) Try to work together as much as possible -- communication among shift crew members is very important during shotsetups, DAQ problems, HV trips, unstable beam conditions etc.

6) In case you need to page somebody, ask SciCo to do it in order to avoid confusion.

7) You don't have to know how to fix every problem off of the top of your head, but you should have an idea of where to find the instructions.

8) "L2 Trigger rate has dropped to zero Hz" error message is always a symptom of other problems

9) The run configuration (which crates are booked) and the trigger table used are in principle completely independent of each other.

10) STANDBY is different from OFF, but "turn the HV off" means go to STANDBY.

11) Each time you suspect some detector configuration has changed, you should start a new run (unless its unimportant as in case of BSU, TSU trips etc.).

12) A run should have at least 10 nb<sup>-1</sup> to be processed by offline farms otherwise you need to request them to process?

13) The SciCo and CO, depending on their experience level, may know less about the system than you do. Don't be surprised when they ask you questions.

14) Do you know where the bathrooms are? ..coffee machine? ..lunchroom? ..40 cent pop refrigerator? ..tornado shelter? ..Silicon Office?

15) Do you know what the SciCo's most important job is?

16) And last but not the least always remember : "Patience is a virtue".

17) ... yeah, but so is efficiency

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**Steve Hahn says: "Do you know the way to San Jose?"**

And an ex-ace-ess (like round -5 ACEs) reminds all...

- All aces **must** wear the proper attire:
    - [Ladies](#)
    - [Gentlemen](#)
- 

Last updated by C Mills and JJ - May 28, 2004

# Operation of Michigan TDC boards at CDF

Eric James, Mitch Soderberg

## Introduction:

The purpose of this document is to provide basic information regarding the operation of Michigan TDC boards used in the CDF detector data acquisition system. The information is intended for graduate students who are new to CDF and will be on shift eventually, as well as for other members of the collaboration who might be called upon to assist with TDC maintenance.

## I. What is a TDC

TDC stands for *Time-to-Digital Converter*. TDC boards measure the arrival times of signals observed on the COT and muon chamber wires, as well the arrival time of scintillator signals from the hadronic calorimeter and muon systems. There is also one TDC board used in monitoring luminosity.

To be more specific, each TDC board used to readout the COT chamber has 96 wires that it monitors. With around 30,000 wires in the COT, this means that there are approximately 315 TDC boards monitoring the COT alone. There are also roughly 130 TDC boards used in the readout of the hadronic calorimeter and muon detector systems.

## II. Types of TDC

There are two types of TDC boards, ECL and LVDS. It is important to understand the main differences between these two types of TDC boards.

The boards used in the readout of the COT wire and calorimeter timing signals are LVDS boards. The COT boards are located on the detector and cannot be accessed during data taking. The LVDS boards used to readout the calorimeter timing signals are located in the first floor counting room and can be accessed during data taking. The boards that monitor the muon chambers and luminosity are ECL boards. All ECL boards are located in crates in the first floor counting room and can be accessed while data is being taken. A list of all TDC boards located in the first floor counting room is given in Appendix A. A detailed accounting of COT TDC boards located on the detector can be found in CDF note #4507.

You can tell whether a board is ECL or LVDS by a quick inspection. LVDS and ECL boards have different front-panel input connectors and receiver chips. The input connectors on the LVDS boards are silver in color, whereas the connectors on the ECL boards are black in color.

During normal operations, the illuminated voltage display lights on each TDC board are different for ECL and LVDS boards. ECL boards should only have the +5, -5, and +12 Volt lights illuminated during normal operation, whereas the LVDS boards should have all (+5, -5, +12, and +3 Volt) power lights illuminated. The remaining four lights on the front panel are somewhat dependant on the operational state of the boards.

In normal operational modes, both the MEM and SEL lights should be illuminated. The MEM light will be yellow and the SEL light will be red (with some exceptions due to the non-availability of certain LED parts during board production). The red and green DONE lights typically blink back and forth at a high rate during data collection.

Most TDC boards have a mezzanine card plugged into them. The mezzanine card controls the trigger output of a given TDC. The brain of a TDC board is called the DSP, and it controls readout of the individual TDC chips on the board. The DSP jumper should always be set to the ON position during normal operation, and to the OFF position only if there is a problem with the board or if you are doing certain types of maintenance to the board (discussed in further detail below). The DSP jumper is a little black plastic piece near the DSP that can be set into the ON or OFF position by hand only when the board is removed from its crate.

All TDC boards have two types of programmable, or FLASH, memory known as FRAM0 and FRAM1. FRAM0 contains information about how the TDC works, which is the same information for all TDC's (ECL and LVDS) no matter where they are located. FRAM1 contains information about the TDC that depends on the board's location (i.e. – the information stored in FRAM1 for a board in the COT will be different than that in FRAM1 for a board used to readout the muon chambers). **Note that FRAM1 must be reprogrammed every time you replace a board!**

### III. Resetting a TDC Board.

A TDC board can be reset manually or remotely. To manually reset a TDC there are three options. The button marked RST on the crate processor can be pressed, which will reset all TDC's in the crate. There is also a reset button on each individual TDC. Pushing the reset button on an individual TDC will reset only that board, not all boards in the crate. When you press the reset button on a TDC you should watch the board to see that the reset is occurring. The SEL light should blink when the reset button is pressed. The third option to manually reset a TDC is to perform a "hot-swap". Hot-swapping involves pulling the TDC board out of the crate and then pushing it back in (after you wait for 30 seconds to make sure that any charge on the board has dissipated) while the crate remains powered on. The SEL light should blink when the board is pushed back in.

You can always check the status of the TDC boards in a particular crate by doing the following from any online computer:

- setup fer
- `~dittmann/bin/cratemap_linux NAMEofCRATE` (*NAMEofCRATE example: b0diag01*) *If you are on a linux machine (e.g. – b0dap\*\*), otherwise skip this command and do the following command instead.*
- `~dittman/bin/cratemap_irix NAMEofCRATE` *If your are on a Silicon Graphics machine, (e.g. – b0dau\*\*).*

The cratemap command should produce a list of the boards in a given crate, along with information about the boards. An example of the output from one board is provided as follows:

➤ 9 IDPROM = 0801 009 MICHIGAN TDC LVDS Rev E DSP = v037

There will be one line like that above for each TDC in the crate. If one or more lines are observed to be missing then the associated boards are most likely in a non-responsive state and need to be fixed. Each line provides the following information (with the information from the above line indicated in parenthesis):

Slot # (9), Serial # (IDPROM = 0801), LVDS or ECL (009 =LVDS, 008 = ECL), Board Type (MICHIGAN TDC), LVDS or ECL (LVDS), Board version (Rev E), DSP Code version (DSP = v037)

There are also two remote reset methods for TDC boards that simply involve logging into the crate processor. The first method of remotely resetting a TDC is the following, (again, from the online computers):

- setup fer
- vxlogin NAMEofCRATE
- VISIONdemo *Press RETURN for the question that pops up after issuing this command.*

You will be presented with a list of options. Among them are:

Option 0 – Exit VISIONdemo

Option 8 – Gives you a map of crate

Option 9 – Master Options

If you choose Option 9, you will be presented with a new set of options. Among them is:

Option 10 – “Issue bus reset”. This accomplishes the same thing as hitting the reset button on the crate processor, which resets all the boards in the crate. The window will lose its connection to the processor during the reset. After approximately 30 seconds the processor will complete rebooting and you will be able to vxlogin into it again.

The other method of remotely resetting a TDC involves issuing the following command from a terminal. Before you do this method you should open a separate terminal and vxlogin into the crate to watch the output of the following commands (this connection will be lost if the reset is successful).

- setup fer
- reset\_crate NAMEofCRATE *This reboots the crate processor AND resets all boards in the crate. The reset signals are sent over grey cables to the tracer. Some grey cables may not be working! So if you can't reset a board with this method, check the cable if possible.*

A final reset method that can also be used is to, instead of using VISIONdemo, vxlogin to the crate and issue a “reboot”. **However, this command reboots the crate processor but does NOT reset the TDC’s in the crate.** Again, having another terminal logged into the crate is a good idea since it allows you to watch the output of commands issued to the crate.

These are all the remote reset/reboot methods that can be performed.

## IV. Reprogramming FRAM

Occasionally you will need to reprogram one or both of the FRAM memories on a TDC board in a crate, such as when you’ve swapped a replacement board into a crate. **As you did when issuing remote resets, open a separate terminal and vxlogin to the crate so you can watch the results of commands being issued to the crate.** To reprogram a FRAM, use the following procedure on e.g. b0dap30:

- setup tdetstand
- cd \$TDCTSTAND\_DIR
- emacs sytem.cfg *You may have to change the name of the crate in the file sytem.cfg. Save your changes.*
- emacs NAMEofCRATE.crate *You have to edit NAMEofCRATE.crate to have the right cards in the right slots. An entry is needed for every TDC card plugged into the crate. Save your changes.*

An example of the things you will see in NAMEofCRATE.crate is the following:

```
[TDC]
Slot:9  Base Addr: 0X48000000
Slot:10 Base Addr: 0X50000000
```

The rule of thumb to follow when trying to figure out what to put for the Base Address is the following: For even numbered slots, Base Addr = (Slot #)/2 followed by 0000000 (seven zeros). For odd numbered slots, Base Addr = (Slot # -1)/2 followed by 8000000 (eight followed by six zeros). Don’t forget to save the files after editing them! After editing the files, do the following:

- tdetstand *(this brings up a GUI)*

From the GUI, do the following:

- 1.) DAQ → initSystem

2.) BoardStatus → TDC → READALL *This should produce a list of board serial numbers. Reasonable serial numbers are anywhere between 100 -> 999.*

If you need to reprogram one or both of the FRAM memories, perform the following steps from the GUI:

3.) Expert → TDC *Brings up a new window.*

4.) FRAM → ENABLE GUI *Enter password and name (this is your hardware database account login information, which you need to get if you haven't done so yet). Make sure "Use HardwareDB" is checked (you usually don't need to change DBConnections).*

5.) LOAD FRAM0 → YES *Now watch the other terminal that is logged into the crate where the board you are reprogramming is located to see what happens. FRAM0 usually does not need to be reprogrammed if you are just swapping boards.*

6.) LOAD FRAM1 → YES *Do this if you have moved boards. Continue watching what happens in your other terminal.*

After doing the above, the memories should be reprogrammed.

If you hit the reset button on the crate processor while logged into the crate on a terminal, you will need to re-establish a connection with it. If hitting the reset button caused your connection terminal to hang, entering Ctrl-Z will kill the hanging process.

**If you are using the test crate in the trigger room only** the following can be done to check the results of the programming. After the FRAM memories are reprogrammed, you should check to see if the Module ID is in all cases the same as the slot number (it should be if things worked!). Also check to see if each FPGA (in the TDC status window) is set to CC009 which it should be for each board if programming was successful.

For boards that are totally nonresponsive (i.e. – those that do not show up when a cratemap is issued or do not respond to any resets) you should move the DSP jumper to the OFF position and remove the mezzanine card before re-programming the FRAM memories. After reprogramming the FRAM memories you can put the mezzanine card back onto the board and put the DSP jumper back to the ON position to check if the re-programming was successful in recovering the board.

It is useful to have the 'tdctstand' files in your own area so you can reprogram the FRAM from there. To be able to do this, copy the following directory to your area: \$TDCTSTAND\_DIR.

➤ `cp -r $TDCTSTAND_DIR ~YourDirectory/TDCtstand`

This directory contains all the files you need (and some you probably don't need) to run "tdctstand" from your own area. This avoids the possibility that someone can alter these files without your knowledge, which could alter the results of executing "tdctstand". Also, having these files in your own area prevents the possibility of file permission problems that can occur in the \$TDCTSTAND\_DIR directory. Once this copy is done,

you will not need to be in the \$TDCTSTAND\_DIR directory to run “tdctstand” (you can do it from your own TDCtstand directory).

## V. Testing TDC boards

Now that you know how to issue resets and reload the FRAM memories, you should be able to test TDC boards to see what, if anything, is wrong with them. You should do the following to test TDC boards if you cannot talk to them initially (i.e. – if a board appears to be non-responsive).

- 1.) Try all possible manual resets.
- 2.) Do a “hot-swap” if possible.
- 3.) Try all possible remote resets.
- 4.) Nonresponsive boards only: Disable DSP if the board has not responded to any resets (move jumper to OFF position), and the board is somewhere accessible. Remove mezzanine card. Hit Reset button on the TDC.
- 5.) Try and reprogram the FRAM.
- 6.) Try and map the crate again on a computer. If you still get nothing send the TDC to Michigan via Prep (see notes below on how to do this).
- 7.) Try and do Run Control tests (see notes below for this).

If you have to send a board back to Michigan, do the following:

- 1.) Using tape, attach a post-it note to the back of the board with a quick summary of what is wrong with the board.
- 2.) Fill out a “Request for Repair Form”, which should be located in the room at the end of the hall west of the control room. Fill out the top section of this form, and don’t worry about filling in the ‘Division’ slot in this section. For the ‘equipment location’ slot, write “B0 assembly hall”. There is also one section for each board you intend to send back. Fill one of these out for every board you send back. For the ‘Manufacturer’ slot, write “University of Michigan”. The Model Number and Serial Number are written on the board. The FNAL Property Number is the number on the little yellow sticker on the front face of the board (the side you would see if the board was in a crate). Ignore lines 2-4 of the section (service call number, system number, etc...). Make a comment in the area provided that is similar to the note you taped to the board.
- 3.) Get a box from the same room you got the Repair form. There should be a foil bag in the box (if there’s not, don’t worry about it) and some padding material. Place the board in the bag, and then place the bag in the box. Make sure you get all the air out of the bag so it will sit correctly in the box.
- 4.) Take the board to Prep. Prep is located on the third floor of the Feynman Computing Center. Go into the West entrance and take the elevator to the rear third floor entrance. As soon as you come out of the elevator you will see a desk where the board should be dropped off.

If you are able to do the steps described above for testing a board, start a Run Control session and do the following to further test the board (as always, you should open

another terminal and vxlogin into the crate so you can watch the results of the following commands):

- 1.) enable DAQ
- 2.) select a partition (0 → 7)
- 3.) select Run Configuration → Private → MeyerA → ALL\_COT.
- 4.) Edit the run: Remove all crates. Add TEST\_TDC\_00 (or whatever crate the board in question is located in).
- 5.) Edit TEST\_TDC\_00 (or whatever crate you're working on) to make sure correct boards are listed in correct slots.
- 6.) Click on Trigger Type. Pick any trigger. Close the Edit window.
- 7.) Begin run as normal and watch the terminal you have logged into the test crate for results.
- 8.) Look for obvious errors.
- 9.) Try doing a HRR if you don't see any obvious errors.
- 10.) If you still see no errors after several HRR's, end the run.

If the above test yields no errors you should try and do the following steps to further test the TDC:

- 1.) In Run Control, enable TDC test.
- 2.) Select a partition (0 → 7)
- 3.) Select Run Configuration → Private → Dan → TDC\_TEST\_DAN (unless you are testing a board located in a COT crate, in which case you should use Private→Kirby→KirbyCurrent).
- 4.) Edit the run. Remove all crates except for the crates you're working on (TEST\_TDC\_00 for example).
- 5.) You don't have to select a Trigger type this time.
- 6.) Select File → Close
- 7.) Partition and setup, then select "Full Test" to start the run. This will cause the terminal you are watching to have some output. You should see the crate go through 11 steps in this terminal (it will say Step 1, Step 2, etc...). You should see no errors in these 11 steps if things are working.
- 8.) Wait for IDLE to become green.

This test will produce several files that you can examine to get information about the TDC boards you are testing. To look at these files, do the following:

- `cd /cdf/code-common/cdfonline/tdc_summary`
- `ls -l *NAMEofCRATE*` *Again, supply the appropriate crate name. Then look for new files that correspond to the date/time you ran the above test.*
- `more NAMEofCRATE.summary`  
*This file should have the results of the above test. It will show if any channels are showing up bad. IF A CHANNEL ON THE BOARD IS TURNED OFF, IT WILL SHOW UP AS BAD EVEN THOUGH IT MAY NOT BE!*

- more NAMEofCRATE.card#.txt  
*You must supply a card # in the above command.  
 (Example: > more NAMEofCRATE.card4.txt).*

These NAMEofCRATE.card#.txt files will show the results of the above test on each of the channels on the TDC in question. Each channel should be reading out 3000 events, (since the above test sends 3000 events into each channel and has the channel read those events out). The number of bad hits, bad starts, and second events should be equal to zero. There will also be other data about the ‘events’ this test sends to each channel, (things such as ‘rms’, ‘dw’, ‘slope’, etc...). Try and make sure these numbers look consistent from channel to channel. There may be other error messages at the beginning of this file, before it lists the results for each channel. Try and correlate any bad channels you see in this file with channels that show up as bad in the NAMEofCRATE.summary file.

Use discretion while looking in these files. If you see a channel that reads out 2999 events instead of 3000, it is probably okay. If there are only a few (~0 -> 20) bad hits and such, the board may still be okay. If you see 0 events read out for a certain channel, that channel may be dead or masked off.

Do “Full Test” multiple times on boards with problems (upwards of 10 or 20), checking the summary files every time. Try and make sure the same error consistently appears in the same channel before you mark a board bad and send it back to Michigan! If you see nothing unusual in this test, look in the shift logbook to see why a particular board was reported as bad in the first place (you may want to do this BEFORE you do anything so you know what to look for!). If you are convinced the board has some operational problem send it back to Michigan via Prep. Make a note in the online logbooks indicating what boards you removed from what crates (if any), and what tests you have done on them. Try and add as much detail as possible so that someone else can use this information if a certain board has problems again in the future.

## VI. Removing TDC's

If you have to replace a TDC board in a crate because it is non-responsive or not working properly, or in cases where there is a non-responsive board in the collision hall where it cannot be accessed, follow the procedures outlined below.

If the board is somewhere you can access, remove it from the crate and replace it with a spare TDC board. You should put the mezzanine card from the non-responsive board into the new board. **Remember to reprogram FRAM1 on this spare after placing it in the crate.** Do Run Control tests on the board you've removed. If you still think it has problems after testing, send the malfunctioning board to Michigan via Prep.

For boards in the collision hall that you are not able to recover from the control room (by sending resets, etc...) you will have to do the following to mark them offline in order for data collection to continue without them:

- setup fer
- cardEditor

*File → Change DB connection. (You must enter your login and password for the Hardware Database.)*

*FrontEndCrates* → *NAMEofCRATE* → *card* (you must supply the appropriate information here)  
*Edit* → *Edit/View selected cards*

You should now be in a GUI that allows you to change parameters for the board you have selected. If you want to exclude a board from the crate (i.e. – the crate will no longer act like that board is present during a run), change the parameter “Online Flag” from 1 to 0. If you were including a board in a crate (i.e. – you want the crate to start recognizing the board), you would change the “Online Flag” parameter from 0 to 1.

**If you use a spare to replace a bad board, and that “hot” spare came from another crate where it was marked online, make sure you mark the spare board’s “online flag” to 0 in the crate it was removed from!**

If you are excluding a board from a crate readout (but leaving the board in the crate), you should also change the global crate parameter “TDCREADOUTMODE” from 0 to 2. This switches the crate from Global Done Mode (0) into Aggressive Local Done Mode (2). Mode 0 only works if all boards in the crate are included in the run, whereas Mode 2 allows the crate to continue working with one or more boards in the crate excluded from data collection.

Note that if you are just swapping boards somewhere in the counting room, then you should not have to change the Online Flag or TDCREADOUT mode because the overall configuration of the crates should not change. The above steps (changing online flag and the TDCREADOUTMODE crate parameter) are needed only in cases where a bad board in the collision hall that can not be replaced needs to be excluded from data collection.

## Appendix A: Map of the TDC's at CDF

Crate	Slot	ECL or LVDS	System	Side/ Region	Phi	Paddle Card Type	Mezz. Card Type	Wedges
<b>B0CMU00</b>	5	ECL	CMU	West	60 → 90	CMU	$\Delta T$	4,5
	6	ECL	CMU	West	30 → 60	CMU	$\Delta T$	2,3
	7	ECL	CMU	West	00 → 30	CMU	$\Delta T$	0,1
	9	ECL	CMU	West	150 → 180	CMU	$\Delta T$	10,11
	10	ECL	CMU	West	120 → 150	CMU	$\Delta T$	8,9
	11	ECL	CMU	West	90 → 120	CMU	$\Delta T$	6,7
	13	ECL	CMU	West	240 → 270	CMU	$\Delta T$	16,17
	14	ECL	CMU	West	210 → 240	CMU	$\Delta T$	14,15
	15	ECL	CMU	West	180 → 210	CMU	$\Delta T$	12,13
	17	ECL	CMU	West	330 → 360	CMU	$\Delta T$	22,23
	18	ECL	CMU	West	300 → 330	CMU	$\Delta T$	20,21
	19	ECL	CMU	West	270 → 300	CMU	$\Delta T$	18,19
<b>B0CMU01</b>	5	ECL	CMU	East	60 → 90	CMU	$\Delta T$	4,5
	6	ECL	CMU	East	30 → 60	CMU	$\Delta T$	2,3
	7	ECL	CMU	East	00 → 30	CMU	$\Delta T$	0,1
	9	ECL	CMU	East	150 → 180	CMU	$\Delta T$	10,11
	10	ECL	CMU	East	120 → 150	CMU	$\Delta T$	8,9
	11	ECL	CMU	East	90 → 120	CMU	$\Delta T$	6,7
	13	ECL	CMU	East	240 → 270	CMU	$\Delta T$	16,17
	14	ECL	CMU	East	210 → 240	CMU	$\Delta T$	14,15
	15	ECL	CMU	East	180 → 210	CMU	$\Delta T$	12,13
	17	ECL	CMU	East	330 → 360	CMU	$\Delta T$	22,23
	18	ECL	CMU	East	300 → 330	CMU	$\Delta T$	20,21
	19	ECL	CMU	East	270 → 300	CMU	$\Delta T$	18,19
<b>B0HTDC00</b>	4	LVDS	Had. Cal.	Central	00 → 30	None	Scint.	0,1
	5	LVDS	Had. Cal.	Central	30 → 60	None	Scint.	2,3
	6	LVDS	Had. Cal.	Central	60 → 90	None	Scint.	4,5
	7	LVDS	Had. Cal.	Central	90 → 120	None	Scint.	6,7
	8	LVDS	Had. Cal.	Central	120 → 150	None	Scint.	8,9
	9	LVDS	Had. Cal.	Central	150 → 180	None	Scint.	10,11
	10	LVDS	Had. Cal.	Central	180 → 210	None	Scint.	12,13
	11	LVDS	Had. Cal.	Central	210 → 240	None	Scint.	14,15
	12	LVDS	Had. Cal.	Central	240 → 270	None	Scint.	16,17
	13	LVDS	Had. Cal.	Central	270 → 300	None	Scint.	18,19
	14	LVDS	Had. Cal.	Central	300 → 330	None	Scint.	20,21
	15	LVDS	Had. Cal.	Central	330 → 360	None	Scint.	22,23
	17	LVDS	Had. Cal.	Plug	00 → 90	None	None	0→5
	18	LVDS	Had. Cal.	Plug	90 → 180	None	None	6→11
	19	LVDS	Had. Cal.	Plug	180 → 270	None	None	12→17
	20	LVDS	Had. Cal.	Plug	270 → 360	None	None	18→23
<b>(Special)</b>	21	LVDS	Laser	-	-	None	None	-

<b>B0CMP00</b>	4	ECL	CMP	Top	N → S (1)	CMU	CMP	-
	5	ECL	CMP	Top	N → S (2)	CMU	CMP	-
	6	ECL	CMP	Top	N → S (3)	CMU	CMP	-
	7	ECL	CMP	Top	N → S (4)	CMU	CMP	-
	9	ECL	CMP	Bottom	S → N (1)	CMU	CMP	-
	10	ECL	CMP	Bottom	S → N (2)	CMU	CMP	-
	11	ECL	CMP	Bottom	S → N (3)	CMU	CMP	-
	14	ECL	CMP	South	B → T (1)	CMU	CMP	-
	15	ECL	CMP	South	B → T (2)	CMU	CMP	-
	16	ECL	CMP	South	B → T (3)	CMU	CMP	-
	18	ECL	CMP	North	B → T (3)	CMU	CMP	-
	19	ECL	CMP	North	B → T (2)	CMU	CMP	-
	20	ECL	CMP	North	B → T (1)	CMU	CMP	-
<b>B0CMX00</b>	3	ECL	CMX	West	270 → 300	CMX	ΔT	18,19
	4	ECL	CMX	West	300 → 330	CMX	ΔT	20,21
	5	ECL	CMX	West	330 → 360	CMX	ΔT	22,23
	7	ECL	CMX	West	00 → 30	CMX	ΔT	0,1
	8	ECL	CMX	West	30 → 60	CMX	ΔT	2,3
	9	ECL	CMX	West	60 → 90	CMX	ΔT	4,5
	11	ECL	CMX	West	90 → 120	CMX	ΔT	6,7
	12	ECL	CMX	West	120 → 150	CMX	ΔT	8,9
	13	ECL	CMX	West	150 → 180	CMX	ΔT	10,11
	15	ECL	CMX	West	180 → 210	CMX	ΔT	12,13
	16	ECL	CMX	West	210 → 240	CMX	ΔT	14,15
	17	ECL	CMX	West	240 → 270	CMX	ΔT	16,17
<b>B0CMX01</b>	3	ECL	CMX	East	270 → 300	CMX	ΔT	18,19
	4	ECL	CMX	East	300 → 330	CMX	ΔT	20,21
	5	ECL	CMX	East	330 → 360	CMX	ΔT	22,23
	7	ECL	CMX	East	00 → 30	CMX	ΔT	0,1
	8	ECL	CMX	East	30 → 60	CMX	ΔT	2,3
	9	ECL	CMX	East	60 → 90	CMX	ΔT	4,5
	11	ECL	CMX	East	90 → 120	CMX	ΔT	6,7
	12	ECL	CMX	East	120 → 150	CMX	ΔT	8,9
	13	ECL	CMX	East	150 → 180	CMX	ΔT	10,11
	15	ECL	CMX	East	180 → 210	CMX	ΔT	12,13
	16	ECL	CMX	East	210 → 240	CMX	ΔT	14,15
	17	ECL	CMX	East	240 → 270	CMX	ΔT	16,17
<b>B0IMU00</b>	3	ECL	TSU	West	270 → 90	BMU	Scint.	18→5
	4	ECL	TSU	West	90 → 270	BMU	Scint.	6→17
	6	ECL	BSU	West	0 → 90	BMU	Scint.	0→5
	7	ECL	BSU	West	90 → 180	BMU	Scint.	6→11
	8	ECL	BSU	West	180 → 270	BMU	Scint.	11→17
	9	ECL	BSU	West	270 → 360	BMU	Scint.	18→23
	11	ECL	BMU	West	0 → 30	BMU	ΔT	0,1
	12	ECL	BMU	West	30 → 60	BMU	ΔT	2,3
	13	ECL	BMU	West	60 → 90	BMU	ΔT	4,5
	14	ECL	BMU	West	90 → 120	BMU	ΔT	6,7
	15	ECL	BMU	West	120 → 150	BMU	ΔT	8,9
	16	ECL	BMU	West	150 → 180	BMU	ΔT	10,11
	17	ECL	BMU	West	180 → 210	BMU	ΔT	12,13

	18	ECL	BMU	West	210 → 240	BMU	ΔT	14,15
	19	ECL	BMU	West	300 → 330	BMU	ΔT	20,21
	20	ECL	BMU	West	330 → 360	BMU	ΔT	22,23
<b>B0IMU01</b>	3	ECL	TSU	East	270 → 90	BMU	Scint.	18→5
	4	ECL	TSU	East	90 → 270	BMU	Scint.	6→17
	6	ECL	BSU	East	0 → 90	BMU	Scint.	0→5
	7	ECL	BSU	East	90 → 180	BMU	Scint.	6→11
	8	ECL	BSU	East	180 → 270	BMU	Scint.	12→17
	9	ECL	BSU	East	270 → 360	BMU	Scint.	18→23
	11	ECL	BMU	East	0 → 30	BMU	ΔT	0,1
	12	ECL	BMU	East	30 → 60	BMU	ΔT	2,3
	13	ECL	BMU	East	60 → 90	BMU	ΔT	4,5
	14	ECL	BMU	East	90 → 120	BMU	ΔT	6,7
	15	ECL	BMU	East	120 → 150	BMU	ΔT	8,9
	16	ECL	BMU	East	150 → 180	BMU	ΔT	10,11
	17	ECL	BMU	East	180 → 210	BMU	ΔT	12,13
	18	ECL	BMU	East	210 → 240	BMU	ΔT	14,15
	19	ECL	BMU	East	300 → 330	BMU	ΔT	20,21
	20	ECL	BMU	East	330 → 360	BMU	ΔT	22,23
<b>B0CLC00</b>	21	ECL	CLC	-	-	CSX	None	-
<b>B0MUSC00</b>	3	ECL	CSP	Top	N → S	BMU	Scint.	-
	4	ECL	CSP	Bottom	S → N	BMU	Scint.	-
	6	ECL	CSP	North	B → T	CSX	Scint.	-
	7	ECL	CSP	South	B → T	CSX	Scint.	-
	8	ECL	CSX – MT	West	0 → 180	CSX	None	0→11
	9	ECL	CSX – MT	West	180 → 360	CSX	None	12→23
	10	ECL	CSX – MT	East	0 → 180	CSX	None	0→11
	11	ECL	CSX – MT	East	180 → 360	CSX	None	12→23
	13	ECL	CSX - RAW	West	0 → 180	CSX	Scint.	0→11
	14	ECL	CSX - RAW	West	180 → 270	CSX	Scint.	12→17
	15	ECL	CSX - RAW	West	270 → 360	CSX	Scint.	18→23
	16	ECL	CSX - RAW	East	0 → 180	CSX	Scint.	0→11
	17	ECL	CSX - RAW	East	180 → 270	CSX	Scint.	12→17
	18	ECL	CSX - RAW	East	270 → 360	CSX	Scint.	18→23